

Lyle Hogan, PE, RRC

Carpentry In The Construction Agenda

The trick to executing a task having many parts is to separate the parts, address what then becomes work segments of less complexity, and, finally, reassemble the parts. The same may be true of roofing projects. Those which perform as intended have proper attention given to each component.

The issue of carpentry becomes important as an accessory to successful roof projects; however, since carpentry is only sometimes the responsibility of the roofing contractor, this feature is often short-changed.

In new construction, it is commonly the General Contractor who provides and installs carpentry, but various types of roofing systems require different types of lumber. For instance, one ply membrane roofs do not require wooden cant strips, and the use of polymer-coated metal accessories does not necessarily require a nailable surface within pre-cast wall panels. The carpenter dispatched to the roof is usually not trained to understand the requirements of a particular roof system.

On the other hand, the roofing contractor should know the requirements of carpentry for his particular assembly but is unlikely to have talents possessed by many carpenters. Accolades go to the roofing mechanic who can straighten a warped, pressure-treated, 2 x 8 as he fastens

along the top of a wall; moreover, affixing a straight stick to a curved wall is a similar challenge, but not a rare occurrence (The sheet metal difficulties encountered are a separate

issue.).

A few recommendations follow to reduce the probability of roofing failures attributable to marginal or poor carpentry:



Photo 1 (Top) and Photo 2 (Bottom)

1. Attachment Devices

Volumes of information could be considered at this juncture. It would be difficult to name a surface for which a suitable fastener has not been developed.

Countersinking, pre-drilling, and unique fastener spacings may become necessary to keep the work in place. It is noteworthy that certain construction adhesives are capable of producing remarkable bond strengths among various surfaces. Photo 1 depicts a stack of nailers where the lowermost was secured to a CMU

wall with adhesives. This was done in the absence of J stirrups grouted into void spaces of the CMU.

2. Stacked Lumber Construction

Where curbs, expansion joints, walls and related features are to be raised above the roof deck, members of a multiple board stack should have interlocked corners (Photo 2). This resembles dove-tailed construction and the finished stack is quite rigid. Each layer in a stack should be nailed individually.

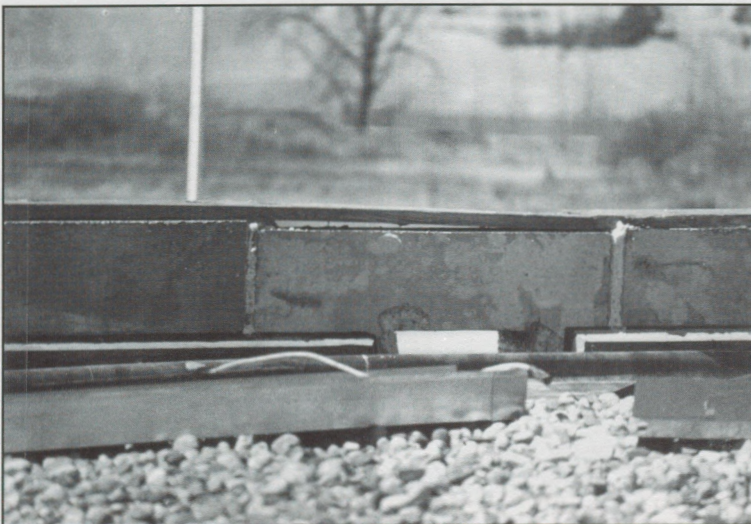


Photo 3 (Top) and Photo 4 (Bottom)

3. Dimensional Changes Of Lumber

Assembled work (such as the built-up wall shown in Photo 3) should have slightly opened joints to accommodate dimensional changes of the pieces. Tightly nested joints may result in surface variations. This is fundamental to plywood decks in steep roof construction. Another occurrence of dimensional change may result from pressure-treated nailers left exposed to wetting/drying cycles. On larger projects, it is not uncommon for such blocking to remain uncovered for weeks or months. Distortion may soon be observed, particularly among end joints and even where such pieces have been rigidly bolted in place. Such work should be covered, even if through temporary measures, when there will be appreciable duration of exposure.

4. Continuity Of Line And Level

Discrepancies in sheet metal work have too often carried the blame rightfully belonging to defects in the underlying carpentry. The situation shown in Photo 4 depicts pre-cast, tilt-up walls of varying height. The topping nailer was required to even out variations in plane, but the sheet metal cap was not as resilient. Leveling shims or elevating chairs could have first been installed to remedy the condition. (The wall fabricator should also have been instructed to correct problems that he created.)

5. Diverging Planes

HVAC curbs on sloping decks provide a common plight on roofing projects. The General Contractor attempts to level the curb by ripping lumber on a diagonal, the wedges of which are used beneath the base of the curb for leveling (Photos 5 and 6, see page 16). This satisfies the Mechanical Contractor but pro-

duces a quandary for the Roofer. The diverging planes of the curb's base flange and the deck results in a transition that even tapered edge strips may not simplify. The effort in levelling the curb should be focused on placing shims along the top. This simplifies work for all the trades involved.

6. Connections

Toe-nailed construction can be functional if one caution is observed. A diagonally-driven nail near the end of a member is subject to produce splitting of the wood and attendant loosening of the work. Pre-drilling a pilot hole in these locations is recommended, especially in pressure-treated lumber. Threaded deck screws can also produce very strong toe-nailed joints; hex or Torx drive fastening devices tool down better than conventional Phillips heads. Values of 175-200 pounds per linear foot have been recommended for restraint of incidental carpentry on roof projects. This restraint is to be attained regardless of the direction of tugging or of separating effort applied. I have never seen this determined in the field. A simple spring scale could be used to quantify questionable work, but difficulty arises in relating a point load applied to a linear member for expression of loading in pounds per linear foot. The foregoing suggestions are the result of site experience as opposed to the application of empirical formulae. These suggestions are then more likely to be implemented by individuals actually constructing the work. Mastery of the Mechanics of Solids is not requisite to reasonable carpentry skills. Understanding Moments of Inertia will not explain differences in strength when fastening across the grain versus with the grain. The best designer of

framed wood construction may see his concept fail when installation techniques are marginal. Finally, a specification should assign responsibility for various carpentry features. When a roofer encounters a questionable carpentry condition to which he is expected to join his work, he should not remain silent regarding his doubts. Failure to raise these doubts at the proper time may implicate him in the eventual nonperformance of such work. A pre-job conference can be the

most effective time to address carpentry/roofing conditions.

The author gratefully acknowledges contributions by:

Mr. Rick Harris, RRC

Mr. Gary Cattel, PE, RRC

Mr. Bill Stevenson, PE, RRC

Mr. Jim Kellum, RRC

Mr. Bill Rubel, RRC

Mr. Richard Horowitz, AIA, RRC



Photo 5 (Top) and Photo 6 (Bottom)